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II.

A N N U A L A D D R E S S .

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SUBJECT—GEOGRAPHICAL WORK IN THE UNITED
STATES DURING 1871.

DELIVERED JANUARY 30TH, 1872.

MR. PRESIDENT AND GENTLEMEN,—At the last annual meeting of the American Geographical Society, your attention was invited to a review of the last decade of geographical researches within the territory of the United States. This evening, in compliance with your invitation, I bring before you an account of the geographical work of our countrymen during the past twelve months. At first it seems to be a familiar and an easy task, but before I have concluded you will surely be impressed with the variety, the magnitude, and the success of the various enterprises which have been in progress under the auspices of American explorers, geographers, and men of science; I trust you will also appreciate the difficulty which there is in collecting and discussing the results of such investigations. It is only by occasional reviews like this that we can appreciate the great importance of maintaining, with vigor and liberality, in the national metropolis, an association, with its officers, its rooms, its collections, its bureau of charts, its library, and, above all, its publications, as the centre to which all important

researches and explorations may be reported, and to which the inquirer in any special field may turn with the certainty of ascertaining the latest and fullest information which is accessible on the subject of his investigations.

I do not know that we can claim any extraordinary activity for our countrymen during the year 1871, for they are always on the alert to extend their knowledge of the earth, and to gather in from the four quarters of the globe information which may be of advantage in its bearings upon scientific truth, or in its relations to the progress of commerce, civilization, and Christianity ; and yet I am quite sure that no recent year has surpassed the one just closed in the amount and value of American geographical inquiry.

I. A GENERAL SURVEY OF THE FIELD.

Let us, in the first place, take a general survey of the labors of our countrymen in this department of research, passing with a rapid glance over all the field, and then let us pause to dwell, as carefully as the brief limits of a lecture will permit, upon the points of most significance and interest.

1. The departments of the National Government have been prosecuting their work of accurate investigations into the structure of our own country with their accustomed diligence, fidelity, and freedom from display. Especially to be held in honor are the officers of the Corps of Engineers of the United States Army, and those of the United States Coast Survey,—two departments of the public service which, in these days of criticism and reproach, may claim our closest scrutiny, and receive our highest commendations. The hydrographic works of these two corps,—the one surveying the sea-coast, and the other the lake shores and rivers,—have frequently received abroad and at home the rich encomiums which they deserve ; but both these corps are now helping on some collateral researches,—the one by the Hassler Expe-

dition around Cape Horn, the other by the work of the surveyors and naturalists of the fortieth parallel.

The Mining Bureau, the Land Office, the Hydrographic Office, the Observatory, the Post Office Department, and the Smithsonian Institution have all maintained their investigations during the year just closed ; but the twelve months are more remarkable for the completion of our decennial census, and the commencement of the publication of those statistical tables which are essential to the study of political progress.

The year is also noteworthy for the perfection of the U. S. Signal Service, which receives by telegraph daily reports concerning the weather, so complete and systematic, that they already throw great light upon the climate, and the laws of storms, and are destined to have more and more influence upon the promotion of human comfort and the protection of life and property.

2. The National Government has also lent its aid to the Polar Expedition of Capt. Hall ; it has caused a rapid reconnoissance to be made of the Island of San Domingo, and it has instituted an inquiry into the fisheries of the coast, under the direction of Prof. Spencer F. Baird, of the Smithsonian Institution.

3. When we turn from the National Government to the separate States of the Union, we find that several of them are still prosecuting their geological surveys,—which are the common form in these days for the manifestation of local interest in natural science. Sometimes these surveys are purely geological, but usually they are extended to all the natural characteristics,—topography, climate, botany, and zoölogy. New Hampshire, New Jersey, Ohio, Indiana, Illinois, Michigan, Iowa, Louisiana, and California have been carrying forward these surveys, and reports have been published in each of these States.

4. By the enterprise of private men of science, and by the aid of great corporations much important knowledge has been accumulated. Chief of all such researches is

the work of the Northern Pacific Railroad Company, which, while actually constructing the railroad line, at both the eastern and the western extremity, is also carrying forward important surveys upon the lofty regions of the North-west. Similar work, of which I have less definite knowledge, is in progress in the South-west.

5. Our various journals abound in minor essays illustrative of American geography, among which should be especially noted the studies of Prof. James D. Dana in respect to the glaciers of New England ; the elaborate inquiry of Prof. Hilgard in respect to the formation of the Gulf of Mexico and the Mississippi Delta ; the essays upon Earthquakes and Volcanoes, published in the *North American Review*, by Prof. J. D. Whitney ; Clarence King's lively sketches of mountaineering in the Sierra Nevada, which appeared in the *Atlantic* ; the contributions of Rev. James Condon, and others, to the *Overland Monthly* ; the Border Sketches of Gen. Marcy, which belong to the lively pictures of frontier-life ; the various studies of the earthquakes of 1870, and the historical survey, by W. T. Brigham, of the earthquakes known to have occurred in New England from 1638 to 1869.

6. Our countrymen have also been more or less at work in foreign lands. A new survey of the Isthmus of Darien has been made by Capt. Selfridge. The head of an important department of the Government, Mr. Capron, has been called by the Government of Japan to investigate the resources and capacity of that empire ; Dr. B. A. Gould has successfully established the observatory at Cordova ; Prof. W. D. Alexander has begun a survey of the Sandwich Islands, upon the method of the United States Coast Survey ; Mr. Squier has been publishing his observations in Peru ; Prof. Hartt has returned from a new visit to the Valley of the Amazon ; Mr. Gabb has been led, by the action of our government, to print a summary of the observations he has for several years been prosecuting in San Domingo ; Dr. Habel has returned

from a seven years' residence in Central and South America, to work up, on the banks of the Hudson, his observations; a party of students from Williams College have been at work under the charge of H. M. Myers, in researches in Spanish Honduras, and a committee of American gentlemen, all of whom have travelled in the Holy Land, has been organized to coöperate with the Palestine Exploration Committee of England in the survey of Biblical lands. This review would not be complete without an allusion to the party of American astronomers who visited the South of Europe, to observe the solar eclipse of December 22d, 1870, and who have been publishing their researches.

Such are the topics which suggest themselves in a rapid survey of the progress of geography, by the labors of Americans, during the year 1871. It is obvious that we can dwell upon only a very few of the undertakings of which I have given you a list. The selection I make is based upon the general interest which may be felt upon the subject; for often the most patient and elaborate work is ill fitted to be brought forward for discussion in a popular address.

II. THE WORK OF THE CORPS OF ENGINEERS, U. S. A.

Under the engineers of the army, of whom Maj.-Gen. A. A. Humphreys is chief, a vast amount of skilful labor is performed, pertaining to the improvement of our harbors and rivers, as well as to the construction and repair of fortifications on the sea-coast and upon the frontier. But, besides these services, several works have been lately in progress, which are of national interest and of geographical significance, directed by this accomplished corps. I refer especially to the survey of the great interior lakes, which has been for many years in successful progress, the survey of the fortieth parallel, the survey of Arizona and Eastern Nevada, and the noteworthy reconnoissance of the Yukon River, in Alaska. For all these matters

of general interest, besides a vast amount of important details in respect to the astronomical, geodetic, meteorological and engineering work of the corps, reference should be made to the report of Maj.-Gen. Humphreys, one of the most comprehensive and satisfactory of all the reports which are annually prepared for Congress.

1. The prosecution of the survey of the great lakes is entrusted to Gen. C. B. Comstock, of the Corps of Engineers, under whose direction in the past year the work was carried forward on Lake Superior, Lake Michigan, Lake St. Clair, Lake Champlain, and on the St. Lawrence River. Among the interesting points in his report may be mentioned the determination by telegraph of the longitude of Detroit, Duluth, and St. Paul; the careful measurement of a base-line, not far from three miles in length, on Minnesota Point, near Duluth; the introduction of plane-table work on the shore of Lake Michigan; the institution of an inquiry into the tides and *seiches* of the lakes (the latter of which, it is suggested, may be due to tornadoes); the prosecution of deep-sea soundings in Lake Superior, with an investigation of the organic life at low depths, by Prof. S. I. Smith; and the diligent elaboration of the ordinary details of the survey by triangulation, topography, hydrography, and the publication of maps. A commencement has been made of a survey of the River St. Lawrence, from the northern boundary of New York to the east end of Lake Ontario; and the southern end of Lake Champlain for thirteen miles has been surveyed.

2. The survey of the fortieth parallel, which is also under the guidance of the Chief Engineer of the Army, has been vigorously prosecuted during the past year, not only by observations in the field, but also by the publication of two of the elaborate reports. Mr. Clarence King, the well-known leader of the expedition, with the title of United States Geologist, has published, in the *American Journal of Science*, an account of the glaciers of the

Pacific coast within the territory of the United States, and he has contributed to the *Atlantic Monthly* a series of vivacious articles illustrative of his experience in "high mountaineering." As the scientific results of this expedition begin to appear, and attract attention at home and abroad, it may be well to recapitulate the outlines of this great survey.

The survey was organized under Mr. King's direction, in the spring of 1867, for the purpose of making a geological and topographical examination of the country bordering upon the Union and Central Pacific railroads, as far to the north and south of the fortieth parallel as practicable. In the first season the survey was carried from the western boundary of California as far east as the second Humboldt range. A detailed examination was also made of the Washoe silver region. The next summer (1868) the survey was carried on in three divisions as far as the western limit of the Great Salt Lake Desert. The Toyabe silver-bearing mountain-range, the White Pine silver district, and some of the metalliferous deposits of Colorado, were also examined. In 1869 the survey was carried eastward as far as the Green River divide, the belt measuring, as before, 100 miles from North to South. A short campaign, in the autumn of 1870, was devoted to a study of the sources of the lava-flows which have poured eastward from the axial line of the Sierra Nevada and the Cascade ranges into the Great Basin. During the summer of 1871 the field work was still in progress, one party having entered the Uintah Mountains from Fort Bridger, working eastward toward the Green River cañon, and the other going from Fort Sanders into the North Park and the Elk Head Mountains. Both parties found the wide-spread smoke a great obstacle to topographical work. The character of the work performed has been, first, topographical, a system of triangulations having been carried from summit to summit over the whole country traversed.

Minor triangles have been measured, the elevations approximately determined upon a system of 300 foot grade-curves located by the barometer, and the altitude of all prominent mountain-peaks and localities upon the plains has also been determined. Careful and actual geological sections have been made over the whole area ; the climatic conditions of the Great Basin have been studied ; the botany and geology of the region traversed received special attention, and the mining industry has been elaborately investigated.

The two portions of the work which have been published within the year lie before you ; one is the report on the mining industry, a volume of text with an atlas ; the second is the report of the botany, the illustrations of which are inserted with the text.

It would lead me beyond the limit of this discourse were I to give a particular account of the two reports ; but they are too interesting to the geographer to be passed by with mere mention.

The first chapter of the volume on mining districts relates to their geographical distribution and geological mode of occurrence. After a brief description of the Great Basin, and a reference to the one prominent law of arrangement of the Cordilleras, that they wend from north or north-west to south and south-east, Mr. King affirms that all the structural features of local geology are in strict subordination to this longitudinal direction of ranges. So, likewise, the localities of the precious metals, as originally noticed by Prof. W. P. Blake, appear to arrange themselves in parallel longitudinal zones. After this introduction there are geological descriptions of the most famous of the mining districts of Nevada, an investigation of the Green River coal-basin, and an inquiry into the mines of Colorado, by Mr. J. D. Hague, especially the gold district of Gilpin county and the silver district of Clear Creek county.

A novelty in subterranean geography or cartography

is presented in the atlas which accompanies this volume, in which many miles of hidden roads and passages are carefully delineated.

The Botany has been prepared by Mr. Sereno Watson, the chief collector, with the coöperation of Prof. D. C. Eaton, in whose herbarium and library the description of the plants was perfected. Somewhat more than 100 species new to science are described, and much light is thrown upon the distribution of timber and on the families of the desert-flora. The work is prefaced by a clear and compact account of the region traversed, with an excellent outline map, and with a very striking general description of the vegetation of the country,—the mountainous and desert region of Northern Nevada and Utah,—the northern portion of what used to be called “The Great Basin.” The vegetation, like the country, should be considered in its two chief aspects,—that of the mountain, and that of the valley. No portion of this whole district, however desert in repute and in fact, is destitute of some amount of vegetation, even in the driest seasons, except only the limited alkali flats. But the vegetation is monotonous in aspect by want of trees and grassy greensward, by the wide distribution of a few low shrubs, and by the universally prevalent gray or dull olive color of the herbage. “The everlasting sage-brush” (*Artemisia tridentata*), familiar to all travellers, is everywhere present. To the general absence of trees the Truckee Valley presents an exception, where two varieties of poplar grow freely in the river-bottom. So on the mountains, which are usually treeless as the valleys, a few scattered varieties of trees are found, mostly within the cañons, and probably never exceeding forty or fifty feet in height. The mountain-flora includes a larger number of shrubby species than that of the valleys, though many of them are very sparingly distributed. The number of Alpine and sub-Alpine plants are proportionally large. The total number of indigenous, phænogamous species enumerated

in the report is 1,235, representing 439 genera, and eighty-four orders,—about one-third of which belong to the mountain flora, one-fourth to the desert flora, and the remainder to the “alkaline” and “aquatic” groups. The essay, from which these particulars are gathered, is a very interesting exhibition of the geographical distribution of the plants of the region.

The agricultural resources of the basin are quite restricted. Even were the rivers and streams most economically distributed, it is estimated that of 34,000 square miles examined in Northern Nevada, not over 1,000 square miles could ever be brought under cultivation. Some investigations were made as to the possibility of cultivating certain forms of vegetation without irrigation, but on a scale too limited to be conclusive.

3. Besides the exploration of the fortieth parallel, there is another important survey in progress, under the direction of Lieut. Geo. M. Wheeler, of the corps of engineers, covering a district considerably to the south of the Central Pacific Railroad, and including sections of South-western Nevada, South and Eastern California, South-western Utah, Northern, North-eastern, and Eastern Arizona. The party, who numbered some eighty-five persons, took the field in May, 1871, and continued at work till December, when they returned to winter quarters. Their purpose has been to attain a thorough topographical knowledge of the country, to determine the latitude and longitude of important points, to observe the geology and vegetation, to inquire into the numbers and condition of the Indians, and the facilities for road-construction, etc. Those who are familiar with these regions will observe that this work is a continuation of that which was carried forward in 1869 by the same officer of the engineers.

From unofficial statements we learn that the success of this great undertaking has been all that could be desired. The months of September and October were devoted to

the Colorado cañon, which was penetrated to a distance of 225 miles above Camp Mohave. The topographical data, the zoölogical specimens, the photographs and drawings, the facts illustrative of the ancient civilization, and the mining information, are said to be full and important.

But one grievous occurrence has saddened this brilliant record. The chief topographer of the party, Mr. P. W. Humel, and that accomplished young writer, Mr. Loring, of Boston, were cruelly murdered by the Apache Indians, on the Wickenburg stage, as they were homeward-bound with the results of their observations, after having encountered, without molestation from the Indians, all the perils and hardships of the exploring party. The notes of the chief topographer have been recovered in a condition for use; those of the volunteer observer, from which an entertaining book might have been expected, can hardly be made use of.

4. Within the last twelve months we have also had from the engineer corps an important contribution to our knowledge of Alaska. The reconnoissance of Capt. C. W. Raymond upon the Yukon River, which was commenced in the spring of 1869, was completed in the summer; and the report, with a map, which hangs before you, was submitted to Congress in April last.

The chief point to which Capt. Raymond's attention was directed was the determination of the latitude and longitude of Fort Yukon. Incidentally, the trade of the region was to be examined, and the condition of the native tribes investigated. He was also directed to ascertain as much as possible in respect to the resources of the Yukon and its tributaries.

The delicate and responsible duty intrusted to Capt. Raymond (which was performed in a highly creditable manner, according to the published endorsement of the chief of his corps Gen. Humphreys), will quickly be comprehended from a single statement. Fort Yukon, the

most northern point of the river of that name, for several years past has been the extreme western trading-station of the Hudson Bay Company. It was supposed to be west of the boundary between Russian and British America ; and, if so, its establishment was contrary to the terms of a treaty between Great Britain and Russia. The Russians, however, had been quite indifferent in the matter ; but not so the Americans, who, after the acquisition of Alaska, began to push up the Yukon River for purposes of trade. This made it very important to determine the exact locality of the fort, and Capt. Raymond volunteered to undertake the difficult and hazardous duty. Launching a little steamer near the mouth of the river, he set out, on the 4th of July, 1869, to make the ascent ; reached Fort Yukon, a distance of over 1,000 miles, traversed wholly by the steamer, on the 31st of the month ; determined the latitude to be $66^{\circ} 33' 47''$, and the longitude $145^{\circ} 17' 47''$; set at rest the question at issue ; informed the traders that they were in American territory ; and, on the 9th of August, took possession of the buildings, and raised the flag of the United States over the fort.

The map which hangs before you embodies, in a cartographical form, the result of this reconnoissance. The maps of a previous date have been based on that of the Russian lieutenant, Zagoskin, which was made in 1842-3, with the corrections and additions of Dall, Whimper, Smith, and other explorers of the telegraph company. The journey of Messrs. Ketchum and Labarge, of the telegraph company, in 1866, first established the fact that the Kvichpak River of the Russians, and the Yukon of the English, were the same streams. These travellers, to whom Capt. Raymond expresses his thanks, have not published their narrative.

The report of Capt. Raymond, extending through 110 octavo pages, is very clear and comprehensive, and throws much light upon our new acquisitions. This reconnoissance, with the work of Mr. Davison, of the Coast Survey,

on the coast, and the volumes of Messrs. Dall and Whymper, are the geographical fruit of the Alaska purchase.

III. THE SURVEY OF CALIFORNIA.

Since the publication of the *Natural History of New York*, and the *Geology of Pennsylvania*, there has been no survey of one of the United States at all comparable in fulness and in importance with the survey of California, now in progress, under the direction of Prof. Josiah D. Whitney. Everybody talks about the wonderful natural resources of the Golden State; but few people, even within its borders, have any adequate conception of the admirable inquiries into, or presentation, of these resources which have been made by the State Geologist and his associates. We presume that the word "geology," while it has had a charm for some persons, has to others conveyed too restricted a meaning. The people of the State cannot have appreciated that under this designation they were securing elaborate and accurate maps of the entire State, and (on an enlarged scale) of certain important localities; a comprehensive study of the physical structure of the country, as a basis for investigations into the climate, agriculture, facilities of communication, and sanitary conditions of a new and undeveloped region; an original investigation of the geology, both in its general and its economic aspects, and a full study of the animals and plants which are native to the region. The size of the State, its wonderful capabilities, its variety of attractions, its marvellous growth, its prospective wealth and influence, are circumstances which render it very desirable that the original survey of the State should be on a good plan, by good methods, and by competent observers. All these conditions have been secured. Only one other element was necessary,—liberal financial support. In this the State has wavered, but now gives signs of a determination to see the work completed as it should be.

However costly the outlay, we are sure it will never be regretted. The strictest principles of economy require that such a work should be vigorously prosecuted and thoroughly performed.

The results of the survey, thus far, are as follows : (a) The publication of a map of the Bay of San Francisco, and its vicinity, on a scale of two miles to an inch, of which a copy was shown to the Society last year. Two other maps are also in the engraver's hands. (b) The first is on a scale of six miles to an inch, embracing about 60,000 square miles in the central and most thickly settled part of the State. Of the four sheets which this map will cover, the two southern are almost ready for publication, and the two northern will be ready in about two years. (c) A general map of the State, on a scale of eighteen miles to an inch, to be issued both as a topographical and as a geological map, will also be ready before spring. Only one corner of the central map remains to be surveyed topographically. (d) Four volumes of illustrated text have also been printed, besides the Yosemite Guide, and various brochures. One of the volumes is a preliminary report on the structure of the State, two are devoted to paleontology, and one to ornithology. The last has been published within the year, and is devoted to the birds, not only of California, but of the North-American continent north of Mexico, and west of the Rocky Mountains. The second volume of the birds is nearly ready. Prof. Baird and Dr. Brewer are its editors. Prof. Baird and Dr. Cooper have prepared the first. During the last year Prof. W. H. Brewer has been engaged in the herbarium of Dr. Gray, in Cambridge, upon the description of the plants of the Pacific slope, collected by him as the botanist of the survey. A volume of conchology is also nearly ready. The geology proper is also to be pushed forward with vigor. Men of science everywhere hail with satisfaction the progress of this publication as honorable,

not only to California, but to American science, and which is published with a degree of typographical and cartographical accuracy and beauty which is worthy of the geological work. Those who would learn more of the nature of the survey may turn with advantage to a fresh and trustworthy article in the *Overland Monthly* for January, 1872.

IV. THE NORTHERN PACIFIC RAILROAD.

The attention of the public is often directed to the financial attractions of the Northern Pacific Railroad, and to the immense advantages which will accrue to the country from the completion of a second railroad line to the Pacific, shorter, lower, and easier than the central route. The central route has already modified the commerce of the world by making this country a common highway from Western Europe to Eastern Asia; and every additional facility for transcontinental communication which is secured increases our national commerce and power. It is not long since I heard one of the high officers of the government, officially informed upon the matter, declare that the solution of our Indian troubles in the North-west depended upon the rapid prosecution and completion of the second Pacific Railroad; for, however jealous the North-western tribes may be of the approach of a party of engineers, they cannot resist the influences of power and civilization which the locomotive brings with it.

But, while some of these general aspects of the Pacific railroads are familiar to us, we are in danger of failing to notice how great a contribution is quietly making to our knowledge of Western geography by the parties of engineers who are persistently carrying the level, the transit, and the barometer into obscure and almost inaccessible parts of the national territory. These surveys have been extended from the Pacific to the Mississippi, on the line of the Northern Pacific Railroad, there being

at the present time, as I am informed, but a short space of seventy miles which remains undetermined by the level.

Gen. W. Milnor Roberts, the chief engineer of this road, has recently returned to New York, and with reference to this lecture has been so kind as to give me much information in respect to the surveys of which he has been both superintendent and participant. He mentioned incidentally the great service which the telegraph had rendered in the conduct of parties in the field, so widely separated. By its aid he has been able personally to direct the work which has been in simultaneous progress upon both the eastern and the western slope of the Cordilleras, sending his orders and receiving information freely by the telegraph.

The work of his parties last summer is of the greatest interest, from the fact that a large part of it was concentrated upon the question as to the most favorable route for crossing the Rocky Mountains in Western Montana, with the subordinate consideration of the Yellowstone Valley on the east as a mode of approach to the summit, and on the west of the relation of the railroad route to the lofty Bitter Root Mountains, which have hitherto been quite inadequately explored.

Those who are familiar with the history of Rocky Mountain explorations are well aware that the earliest crossing of the Divide took place in the region which was so carefully examined last summer. Here it was that, in 1805, Lewis and Clark, those intrepid pioneers, attained the highest waters of the Missouri, crossed over the water-shed, and descended, first of white men, into the tributaries of the Columbia. We may well, in this connection, refresh our memory by turning to their narrative.

Since the days of Lewis and Clark our maps have borne the names which they attached to the mountain-streams—Jefferson, Madison, Gallatin, and Dearborn, the president and secretaries of the National Government in the

time of these explorations ; and the map which they gave us (poor as it now appears) remained for half a century our most complete, I may almost say our only original portrayal of the region. Then came, in 1853, the Pacific Railroad surveys of the General Government, conducted in this part of the country by Gov. I. I. Stevens. A little later, one of his chief collaborators, Capt. Mullan, U. S. A., was detailed to construct a military road from Fort Walla-Walla, on the Columbia, to Fort Benton, on the Missouri,—a work which occupied him from 1858 to 1862,—and now the actual construction of a railroad has already been begun. The task of Capt. Mullan occupied him four years, when a wagon-road of 624 miles was completed across the Rocky Mountains.

The summer of 1871 has thrown a vast amount of light upon the Montana passes ; four parties, besides that of the engineer-in-chief, Gen. W. M. Roberts, having been engaged in investigating this group of mountain-entrances. To understand their work, two points of departure must be kept in mind,—the town of Helena, Montana, or, better yet, a point a little south of it, where those two well-known streams the Gallatin and Jefferson come together. The second point of departure is the junction of the Deer Lodge and Little Black Foot rivers, on the western slope of the Rocky Mountains. We may term these departures One and Two.

One of the parties of the Northern Pacific Railroad last summer went up from Departure One, along the easternmost of the three Missouri affluents,—the Gallatin, over the Bozeman Divide, and so into the Yellowstone ; a second from the same departure went up the western affluent, the Jefferson, over the Deer Lodge Pass, and so down to the Departure Two ; a third party, starting from Departure Two, proceeded down the Hell Gate and Missouri Rivers, into the Bitter Root Mountains, and so to the Jocko river ; a fourth party examined the Lower Dearborn valley to its union with the Missouri,

and then westward up the Dearborn valley, examining the passes known as Cadotte's, and Lewis and Clark's, and going over the mountains to Departure Two.

Gen. Roberts made a personal examination of eight passes between Cadotte's, on the north, and Deer Lodge, which is about eighty-five miles south in an air-line; and his observations led him to order an instrumental survey of the most promising pass, "Ten-Mile Pass," from the initial point on the Deer Lodge, over the pass, and so down to the Missouri, a few miles north of Helena.

Meanwhile other parties were at work between Montana and the Pacific, farther west; one going up the Clear water toward the summit of the Bitter Root range, and afterward, going down the Snake River from Lewiston; a second party surveyed from the summit of the Cascade down the Yakima to the Columbia; a third party were at work on the "Forty Miles," beyond the Cowlitz residency, and a fourth was engaged to make a reconnoissance from the Columbia River, near Lake Chelan, towards the Pend d'Oreille country.

Besides all this work, the engineer-in-chief made an instrumental reconnoissance of the Yellowstone valley.

The results of such a number of investigations are obviously important. They involve several points of interest. First, the best approach from the east to the Rocky Mountains, is it the Missouri or the Yellowstone? Second, in either case, what is the best way over the Rocky Mountains? or, in other words, which one of eight passes, in a region of nearly 100 miles long, is to be preferred? Third, what is the best way down the Pacific slope to the valley of the Columbia,—is it the Mullan wagon-road or some other way? Fourth, the best route down the Columbia valley, and, finally, the structure of the Cascade Mountains? On all these points the company has secured, by the work of last summer, detailed information (for which in due time the world will be wiser); but it is not quite ready to publish it.

Gen. Roberts comments on the productiveness of Montana like most other persons who have been there. He says that the soil in the valleys and on the slopes of the foot-hills excels in productiveness any region where he has dwelt, excepting Oregon and Washington.

He anticipates that the road will be open to the Missouri in the fall of 1872; that it may be extended to the Yellowstone in 1873. During 1875 the line could be graded, and the track laid over the Rocky Mountains to meet there the line from the Pacific, if that end of the track should be completed with equal despatch.

One of the subordinate surveys carried on, under the auspices of this great corporation, during the past year, was conducted by Gen. T. L. Rosser, from the Missouri River, at Fort Rice, to the Yellowstone, by the way of Heart River and Glendive's Creek, a distance of 226 miles. As it happened that I was at Fort Wadsworth, D. T., on that lofty plateau which is called the Coteau of the Prairie, when a part of the escort for Gen. Rosser's party went forth last summer, and thus heard from the leader of the expedition an account of the problems to be settled and the difficulties to be encountered, I have looked with much interest for the publication of the results of their summer's work, and have been favored with an early copy of it. Much apprehension was felt lest the Indians, who watch with jealousy what we call the advance of civilization, should attack the survey, and so a strong escort was fitted out under the command of Gen. Whistler. No trouble was given by the Indians, except the burning of the grass, which would have been useful as forage.

The party reached the mouth of Heart River September 11th, and proceeded at once to survey it. They soon reached the Heart Butte, the deserted seat of Black Feet's empire, and, a few miles west, came upon a field of coal which was thence continuous to the Yellowstone. In several places the coal was burning, and appeared to have been

doing so for years. At the top of the ridge which divides the waters of the Heart and the Little Missouri, the Mauvais Terres were first seen, and appeared to be an insurmountable obstacle; but soon a water-course descending into the valley was discovered. The stream running through this valley he named Dave's Creek; its waters are strongly alkaline, the timber chiefly cotton-wood, and "very scattering." From Dave's Creek the party went over into the valley of the Little Missouri, a tortuous cañon, the walls of which are some five or six hundred feet high. The bluffs in many places show advantageously the peculiar geology of the Mauvais Terres. Running down this stream five miles, he reached Andrew's Creek, and ascended it to the prairie level, from which he descended again to Inman's Fork, one of the tributaries of the Little Missouri. Beyond this fork is the divide between the Little Missouri and the Yellowstone. Glendive's Creek led the party down to the valley of the Yellowstone; the stream being here 1,000 feet wide, the valley about two miles. A map and profile of the regions were prepared by the topographers, Messrs. Meigs and Eastman.

It is greatly to be desired that the gentlemen who are in charge of this national undertaking will find an opportunity to give to the public the scientific results of their recent surveys, and especially that the measurement of altitudes and distances in regions where a road is not finally located will be preserved and published for the benefit of future inquirers.

V. THE YELLOWSTONE GEYSER REGION.

No portion of our national domain has of late been regarded with so much curiosity and surprise as the region of geyser and hot springs, which has been brought to light near the sources of the Yellowstone and Fire Hole rivers, just east of the divide between the Missouri and the Columbia. So remarkable are the narratives of the visitors to these regions that a bill is now pending in

Congress to reserve from settlement, under the name of a national park, the tract in which the most surprising of the phenomena appear. It is satisfactory to know that the bill will probably become a law.

On the latest-published maps of the Engineer Department, the courses of the Upper Yellowstone and the Fire Hole rivers are faintly delineated ; but on the map of Mr. De Lacy, Surveyor-General of Montana, the local nomenclature and the approximate courses of the rivers are more fully brought out ; and on the two maps which, by the courtesy of the engraver, Mr. Julius Bien, of New York, I am able to bring before you, the exact position of the principal geyser and hot springs is indicated. These two maps were drawn by Mr. E. Hergesheimer, of the United States Coast Survey, at the instance of Dr. F. V. Hayden, to illustrate his report upon the region. The substance of this report, with reduced copies of the map, will be found in the *American Journal of Science* for February and March, 1872.

In connection with this report of Dr. Hayden's, reference should be made to the early story of the Washburne-Langford party, which was printed in *Scribner's Monthly* for 1871, and which gives a very graphic account of the region ; to a narrative by Walter Trumbull, in the *Overland Monthly* ; and to the report which has been published in full by various newspapers, within the last few days, of the expedition of Capt. Barlow, of the United States Engineers, which visited this region in the summer of 1871. The survey of Gen. W. Milnor Roberts, already referred to, began at a lower point upon the river, east of Bozeman's Pass, and continued towards the Missouri, and Gen. Rosser touched the river at a much lower point.

VI. THE NINTH CENSUS OF THE UNITED STATES—1870.

During the past twelve months the publication of the results of the ninth census of the United States has been commenced, and we have before us now the advance

sheets of the Statistics of Population by States and Territories, both in the aggregate, and as white, free-colored, slaves, Chinese and Indian, at each census. We have also the Report of the Superintendent of the Census, Gen. F. A. Walker, on the conduct and results of the work entrusted to his charge. Although the law of Congress under which this decennial enumeration was taken is far behind the requirements of modern statistical science, its execution was entrusted to an excellent officer, and the results may be received with great satisfaction and confidence.

But as this Society no longer recognises the statistical side of geographical inquiry, I do not feel at liberty to dwell at length upon this topic, and indeed I should hardly have introduced it at this time were it not for the sake of presenting to you some of the results of the census in a very clear and instructive cartographical aspect. It is fair to presume that you are still interested in the geographical side of statistical inquiry.

The manuscript maps which I now hold before you were prepared under Gen. Walker's direction in the census office, as examples of the mode by which the results of the census may be exhibited on maps. These very maps are soon to be presented to the appropriate committee in Congress, in the hope that their publication will be commended, and that other kindred maps will be prepared and given to the public under the supervision of the Census Bureau.

These maps are seven in number.* I hold up first a map of Alabama, which shows at a glance in what part of that State the Africans preponderate, a series of tints being employed, as you observe, which are darker in proportion as the number of Africans increases. Now, it would take a long time to discover from a column of

* This portion of the Address was given *ex tempore* as the speaker turned to the maps, and was reported with difficulty.

figures the fact which you here see at a glance ; that through the middle of the State, from East to West, there is a black belt where the colored people are most numerous. No alphabetic list of counties would suggest that fact, or enable us to surmise the reason. It would perhaps have been better if the structure of the country had been more fully delineated, for here we have only the water-courses. An exhibition of the altitudes of the State would have been a desirable feature.

Here is a similar map for the entire Southern sea-board, which exhibits the distribution of the Africans, not county-wise but State-wise. You see here at a glance that the blacks preponderate in South Carolina. Louisiana stands next. Then comes Virginia, North Carolina, Texas, Arkansas, Tennessee, Maryland, Kentucky, and so on. Underneath this map hangs a map of the same series of States, exhibiting the same class of facts ten years previous, when the census of 1860 was taken, and these two maps, if compared, will show the effect of emancipation upon residence. Here you see South Carolina, in the present census, is the darkest. So it was in 1860. Georgia and Alabama stood second ten years ago. They stand third now. Louisiana stands second, and Mississippi has entered the same grade as South Carolina, when, ten years ago, it stood below. Texas, which was ten years ago fourth in rank, is now the fifth.

Here is another map which exhibits the distribution of foreigners at the South ; on it we see that the foreign born population is thickest, where the Africans are not, and *vice versa*. South Carolina, which was darkest before, is lightest now. Missouri, where the Germans have so largely gone, stands foremost. West Virginia and Kentucky are alike. Texas corresponds with Delaware. In the South-east is a region where very few foreigners have gone ; more to Florida than Georgia, more to South Carolina than to North Carolina. Here we have the Northern States, a map of the former free States,

showing the proportion of foreign to total population. You observe how the line of emigration has been through the North ; and it is very curious that of people coming in from Europe, the densest population is found farthest from the sea-coast. They are pressing into Minnesota, the State which has the largest proportion of foreign born people. Wisconsin stands second. New York third, corresponding with Nebraska, and with Massachusetts ; Connecticut is fifth ; then comes Illinois and New Jersey, and Iowa ; and Maine is eighth, corresponding with New Hampshire and Indiana. Here we have another map, exhibiting the proportion of blacks in the Northern States. You see that a State where they cling most decidedly is Kansas. New Jersey next. Ohio next. The Southern tier, you see, has their company more than any other. The last in rank is Minnesota, where we saw before that the foreigners most abounded.

This map (showing another), although you can hardly see it across the room, is to me the most interesting of all ; first, because it is a map of the whole country ; and second, because it is prepared with special study and care.

It is intended to show us in what parts of every State the German element is most abundant, and then by making a deduction for this preponderance in certain regions, to show what is the average distribution in the remainder of the State. Notice, for example, in Missouri the preponderance of Germans in the St. Louis region, and their comparative scarcity in South-western Missouri. See in New Jersey the marked ascendancy of this element in Hoboken and Jersey City, and their vicinity, while in the State, as a whole, the German element by no means preponderates.

But I will not dwell longer upon these instructive diagrams, for they were not designed to be shown to so large an assembly. The interest, however, which you manifest in them, leads me to express the hope that the Society, as individuals and as a body, will exert what influ-

ence they can rightly bring to bear upon Congress, to secure the publication of some such diagrams as those which you have before you.

As an example of what may be done in this graphic mode of representation, let me call your attention to a beautiful series of printed maps, which the Prussian government has recently printed. I refer to the atlas entitled *Der Boden und die landwirtschaftlichen Verhältnisse des Preussischen Staates, nach dem Gebietsumfange vor 1866, von A. Meitzer*,—a work in which, with great clearness, accuracy, and beauty, the territorial divisions, the geographical and geological structure of the country, the density of the population, the wealth, taxation, distribution of industries, etc., etc., are cartographically presented.

VII. PROPOSED AMERICAN EXPLORATIONS IN THE EAST.

It is a little beyond the scope of this discourse to speak of work projected by our countrymen, especially in other lands, but the great importance of the plans to which I am about to refer will certainly justify the reference.

The admirable purposes and results of the Palestine Exploration Fund of London are well known in this country, but hitherto very little effort has been made to enlist the coöperation of our countrymen in their important efforts to thoroughly investigate the land of the Bible. At first this seems a little strange, for the Americans were pioneers in the field of inquiry, and since those epoch-marking researches of Dr. Edward Robinson, and his learned associate, Dr. Eli Smith, several of our countrymen have made important contributions to the geography of the East. In Palestine alone the researches of Lynch, W. M. Thomson, Barclay, Osborn, Hackett, Wolcott, Johnson, and many others, are especially noteworthy. A plan of coöperation has lately been proposed by which Americans can help forward the work of Syrian exploration more effectually, it is thought, than by contributing

to the English fund. A committee has been formed in New York, made up to a great extent, of persons who have travelled in the East ; and it is purposed to collect a sum of at least \$10,000 to be expended by this committee upon some limited region where the English are not at work, thus supplementing their investigations. The Archbishop of York has written to the president of the American committee, Dr. Jos. P. Thompson, expressing the satisfaction felt by the English committee of which he is chairman, at the formation of a committee in New York, so that no apprehension of rivalry or reduplication need be anticipated. Dr. William M. Thomson of Beyrout, has made a recommendation which the New York committee adopts, that the field of exploration be the region east of the Jordan Valley and the Dead Sea ; if possible also, Hermon, the Lebanon, and the plains and valleys of Northern Syria. He suggests Kerak, south-east of the Dead Sea, as the first station for the Moabite region, and thence he would have the survey continue through Gilead and Bashan into the east region of the Hauran.

No one can doubt the fruitfulness of this field in geographical and archæological respects. To secure the harvest, only money is needed ; services of competent men will then be engaged as explorers, equipped with all the resources of modern science. Certainly in a plan like this, the American Geographical Society must take a deep interest.

Mr. President : My hour is gone ; my task is done. Let us hope that the current year will be as full of good results as that which we have reviewed.